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Abstract

This paper investigates rationality of herd behavior in the accounting policy decisions by using a write-off policy of unfunded pension benefit obligation (UPBO) as a research material. Although the accounting standard for retirement benefits in Japan in 2000 allowed the companies to choose the write-off period between one year and fifteen years depending on their write-off abilities, more than 60% of the companies disclosed the period within 3 years, especially one year before the balance sheet date. There might have been herd behavior in policy selections with the companies that currently reported poor income and nonetheless chose a short period of write-off policy. We found that many of these companies did not unreasonably write-off UPBO and that the capital market saw through whether their write-off policies were concomitant with their capabilities or not. If a market is efficient and participants are aware of it, accounting regulator's policy for giving the companies the room for choice does not cause an irrational herd behavior in accounting policy.

1. Introduction

In June 1998 the Business Accounting Council of Japan issued "A Statement of Opinions on the Establishment of Accounting Standards for Retirement Benefits," for the purpose of establishing accounting standards for corporate pension plans, etc. The

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standards required a company to account for unfunded pension benefit obligation (UPBO) as the provision for retirement benefit on the balance sheet since the fiscal year commencing on or after April 1, 2000. It was predicted that the change from the old standard to the new standard would bring an awareness of large UPBO³, and it was feared that this may have a significant effect on corporate management. In response, the Business Accounting Deliberation Council, as a transitional measure at the time of the change in accounting standards, called UPBO that occurred at the time of transition Accounting Standards Transitional Difference (ASTD), and allowed the companies fifteen years to write-off the increase in liability over that which would have been recognized at the same date under the company's previous accounting policy. The establishment of that write-off period left managers with substantial discretion⁴. However, many companies -more than 70% of sample companies⁵- responded to the inquiry of Nikkei and Nikkei Kinnyu Newspapers by explaining that they would choose a short period write-off policy in spite of the institutional consideration. An eventual herd behavior⁶ was observed.

(Please insert figure 1 here)

³ According to Nikkei Shimbun's investigation of 230 of 300 companies (balance sheet date: March) in the Nikkei Index, the total amount (consolidation base) of UPBO for Japanese companies surveyed was 9,780 billion yen. Of the 9,780 billion yen, 5,100 was written off as extraordinary losses in March 2001.

⁴ For example, as a potential remedy, the Tokyo Stock Exchange allowed the companies to add back the amount of UPBO write-off to net income when it was checking whether a company's financial figures conflicted with the listed requirements or not. (For detail, see Okabe [2002]).

⁵ The sampling companies, which we used in this paper, are those that responded to the inquiries of Nikkei and Nikkei Kinyu Shimbun (from April 1999 to March 2002) with the amount of UPBO and its write-off period. Although 113/230 companies (49%) wrote-off their UPBO within one year according to the above investigation (note 1), 61% of the companies planned to write-off within one year according to our data. This might be because some of the companies that planned to write-off for a long period did not respond to the inquiries.

⁶ The terms of herd behavior are used not only for the intended behaviors, but also for the eventual behaviors in this paper, according to Hirshleifer & Teoh [2001], Nakagawa [2002] and many other past researchers. As a result, there are two kinds of herd behaviors: a company intentionally follows a precedent and each company individually chooses a rational alternative and therefore chooses a same alternative.

Precisely, there were two means of writing-off unrecognized UPBO: expensing the amount (at the same time, providing a same amount of liability) and contributing the amount of cash or financial instruments to the pension funds (see figure 1). It appears that the former is the problem of cost allocation, which does not influence cash flow, and the latter is literally a problem of cash flow. However, both of them are the same in evaluating the enterprise value as discounted future cash flow because the companies would have to pay directly to the employees or contribute the amount of money or financial instruments to the pension funds in order to write-off the provision for UPBO unless the short term worsening of operating performance and/or of financial positions cause the worsening of economic reality of the company through the various contracts.

However, if the information of the change of allocation methods would include the additional inherent information of managers, this information may change the stock prices. In fact, the impact of this change on the stock price has been actually observed. On the one hand, the regulator allowed companies to write-off the same amount of ASTD within fifteen years only at the time of the accounting standard change. As a result, now, if those who need the information about a company can obtain additional information, it is “screening⁷,” from the regulator’s point of view, irrespective of their intentions. On the other hand, from the company side, it theoretically means “signaling⁸.”

If there is much irrational (deceiving on the face of accounting appearance) behavior in “herd behavior” concerning the write-off policy choice at the time of the

⁷ Screening is a method of causing persons to expose their attributes by causing them to make a choice, by presenting them with several alternatives where information on an attribute is unclear. The examples below are often given to illustrate self-selection. (1) When characteristics of an insurance company’s policyholders (risk of involvement in accidents, etc.) are unclear, the insurance company can induce policyholders to reveal characteristics by having them choose between a low premium or low indemnity product and a high premium or high guarantee product. (2) A company can induce employees to reveal characteristics (confidence in their own capabilities, etc.) by having them choose between an unregulated compensation plan and an annual salary system (Stiglitz [1993], pp.538-539, Nishimura [1995] pages 319–321, Okuno & Suzumura [1988] pages 155–162 and 394).

⁸ We will explain the definition of signaling in page 5.

accounting standard change⁹, institutional consideration did not realize as intended before¹⁰. To make things worse, it might cause irrational herd behavior by giving companies the chance of “signaling,” by choosing other than the best policy.

This paper analyzes the rationality of herd behavior in accounting policy by using the data in the articles of two newspapers during the period between April 1999 and March 2002. It concerns the amount of UPBOs and their write-off periods, and verifies whether the accounting standard functioned as the institutional purpose or not.

2. Discussion on Herd Behavior

The words “herd behavior” are used in the various meanings: with or without intention (intentional or accidental), to whom it follows (the information advantageous precedent or the information cascade), and the rationality of results.

Although the representative explanations are introduced below, the same “herd behavior” may be explained by plural theories because of plural axis of difference. The following explanations are not exclusive of each other.

(1) Coincidence of Individual Rational Behaviors

Apparent herd behavior (not following the others) occurs because each company chooses an alternative that it considers the most rational. For example, many banks begin to make a loan to the companies in the specified industry when they get the disclosed and/or private information that the industry shows as promising.

(2) Inference from informed agents

This type of herd behavior occurs when those who are in information disadvantage follow those who are in information advantage. A typical case is as

⁹ Fukui [2002] indicated that avoiding irrational herd behavior is one of the important roles of accounting standards.

¹⁰ Nakano [2004] refers to the possibility of irrational herd behavior in the write-off policy of UPBO.

follows: Japanese banks have been compartmentalized - on the one hand, small and medium sized banks (SMBs) have made a loan to small and medium sized companies (SMCs) and have accumulated the information about SMCs. On the other hand, large banks (LBs) have made loan to large companies and have accumulated the same the information about large companies (LCs). However, as this compartmentalization collapses, which means occurrence of the mutual intervention of all banks, SMBs (information disadvantage) follow the way of loaning of LBs in making a loan to LCs (information advantage), and conversely, LBs (information disadvantage) follow the way of loaning of SMBs (information advantage) in making a loan to a SMCs. (Nakagawa [2002], pp.217-218).

(3) Signaling

There is an asymmetry in the knowledge of a company's internal information (private information) between corporate managers and investors, and managers have superior access to information, while investors are at a disadvantage. Effective measures to alleviate this information asymmetry include (1) signaling by insiders (individuals with information advantage), or (2) inducing insiders to reveal their own attributes using a screening mechanism (Akerlof [1970], Spence [1973], Stiglitz [1993]).

The definition of signaling is as follows: among individuals with information advantage, with regard to a specific attribute, there is a high-quality group and a low-quality group. When under-informed parties cannot observe that attribute, they may try to distinguish the high-quality group from the low-quality group, bear the cost, and send a signal revealing their own quality level (Spence [1973]). It is rational for a company to reveal the fact that it can write-off UPBO within the short period if it can actually afford to do so. As a result, the companies which cannot afford to do so in the short period have the motivation to reveal the power to do so until they hurt their future performance.

If a company can improve the actual financial condition because its reputation grows by maintaining a facade of accounting performance, it might be rational. If a manager has to sacrifice important things by adopting this policy and capital market participants know it, and if they cannot make a sharp distinction between the companies that have an actual lump-sum write-off power and the companies that maintain a façade of accounting figures, they may be misled in the direction which the latter companies want to move by maintaining it.

Whether a capital market can or cannot see through a company that is doing more than what it can afford to do is a key point concerning the success and failure of this policy. If a company has known that maintaining a facade is effective because the market cannot see through the fact, this kind of herd behavior may frequently occur.

(4) Information Cascade

A few companies chose one of the alternatives, which they considered the most rational, at the early stage of implementation of the new accounting standard. After that, the companies which confront the same choice may choose the same alternative either because they are scared that they will be suspected by the capital market of departing from the 'standard' (first small group's choice) or because they thought they misjudged the situations, despite the idea that another alternative was the most rational. (Fukui [2002]). As a result, many companies follow the first group. The former information cascade is explained as follows: Companies are scared of the negative evaluation from the capital market due to the 'standard' deviation. This explains "signaling behavior." The latter information cascade is explained as follows: The only reason that groups follow the first group is that the first group is the precedent, not based on their own judgments and not identified as an information advantage. Therefore, this explains irrational information cascade.

Concerning the write-off of UPBO, there was the possibility of information cascade

because a wide variety of choices were initially observed and the number of the companies which wrote-off UPBO within one year gradually grew. However, 'standard' was not necessarily formulated in early times.

3. Survey of Prior Researches

In this section, we will survey prior researches which focused on herd behavior or analyzed ASTD write-off policy.

(1) Herd behavior

Firstly, prior researches concerning "herd behavior" are surveyed. Scharfstein and Stein [1990] shows the model that managers tend to follow other managers' investment behaviors in order to avoid a market degrading. They said that the possibility of application of this model for herd behaviors is in the case of firms' facility investment, securities investment at capital market, and decision making in a company (voting behavior at the meeting) , etc. Bikhchandani and Sharma [2001] surveyed herd behaviors in capital markets and researched and showed the reasons why an investor follows investment behaviors of other investors and the structure of herd behavior. Nakagawa [2002] shows that Japanese SMBs loan to major companies by following LBS' behaviors without their own judgments. Hisa [2007] defined that "herd behavior" is the coincidence of facility investments by firms in the same industry. It also demonstrates that there is a strong tendency for herd behavior in the industries which Japanese manufacturers control and there is a weak tendency in the industries which financial institutes and foreign manufacturers control. In the past, much of the research about herd behavior has been about investment in the capital markets, companies' investment in facilities, and banks' borrowing behaviors.

(2) Write-off policy of ASTD

Next, we will review researches that investigate the factor influencing the manager's decision making of ASTD write-off period. Firstly, we'll explain the literatures which focused on relationship between write-off period and the effect on the net earnings.

Hiki [2003], through investigation of the number of years over which ASTD was written-off, reported that (1) companies that were expected to fall into the red if they selected the lump-sum write-off option chose the long-term write-off option, (2) companies that were expected to end in the black if it chose the lump-sum write-off option selected the lump-sum write-off option within 1 year. Otomasa [2008,a] conducted a research similar to Hiki [2003], and found same result. In addition, Otomasa [2008,a], through multi-regression analysis that made the years of ASTD write-off as dependent variables, demonstrated a tendency of companies with large profit, ample internal reserves, and large total assets to select short-term write-off option. Choi and Tokuga [2007] found that well performing companies with a smaller ASTD companies made the choice of short-term write-off, by conducting logistic regression analysis with binary dependent variables on data of companies with short term write-off period.

On the contrary, there were some literatures that referred to the possibilities that companies took no account of the effect on the figure of net earnings and reported their ASTD write-off period. Nakano [2004], after confirming the circumstance that almost half companies chose option of lump-sum write-off within one year, mentioned subjective opinion that there was one possibility some companies chose lump-sum write-off policy regardless of their write-off ability to take a same accounting policy as leader company in their industry (taking herd behavior) (Nakano [2004], p.145).

Secondary, some literature pointed out the possibility that corporate managers decided the write-off period by considering not only effects on net profit, but also effects

on accounting figures embedded in contracts. The Business Accounting Council of Japan allowed a company to write-off ASTD as extraordinary losses if it would achieve its ASTD write-off within a five-year period, otherwise, the company was required to write-off ASTD as ordinary expense (selling, general and administrative expenses). In other words, if a company had some contracts incorporated with figures for ordinary profit and/or net asset which could be affected by net profit, there is a possibility that the contracts would influence the decision on the ASTD write-off period. Yoshida [2005], by focusing on the financial covenants attached at the time of bond issue, found that a company which had contracts incorporated with the treatment of ordinary profit maintenance preferred the short-term write-off option within five years to make its ordinary profit look better. And it also found that a company which had contracts with covenants of net assets maintenance attached preferred the long-term write-off option over five years in order to make its net profit look better (or to avoid reporting net loss). Otomasa [2008,b] pointed out that, in many cases, executive compensation would be determined based on the level of ordinary profit of their company. On that basis, he tested his hypothesis that a company which had a stronger linkage between executive bonus plans and the level of ordinary profit would select the short-term write-off option. However, evidence that the existence of executive bonus plan would affected the ASTD write-off period was not observed.

Finally, we will refer to a research that investigates whether managers decisions about the period of write-off policy conveys some additional information to investors or not. Theoretically, the inter-period allocation of pension costs does not involve any cash flow effects in calculating periodic accounting income, and hence has no influence on the value of a company. Therefore, the value of a company is not expected to change depending on the number of years over which unfunded pension liability is written off, as the length of write-off period only involves differential inter-period cost allocations. On the other hand, the choice of a cost allocation scheme per se may serve as an indicator

of potential profitability or future cash flow prospect of a company and thus, could influence the expectation of investors.

Regarding the information content about the change of allocation methods, there has been research about the depreciation expense. The research is about the time series variation of stock prices of companies that increased their reported incomes, owing to the change from the accelerated method to the straight line method (Kaplan and Roll [1972], Archibald [1972]). Based on the research, a positive reaction in capital market was observed in the vicinity of income reporting, though the reaction reversed extremely to negative after that. This means that the capital markets obtain the additional information from the information about depreciation methods and/or their changes¹¹.

Taking those researches' results into our consideration, we can assume the possibility that the difference of ASTD write-off policy would effect on the corporate value. Choi and Tokuga [2007], focusing on the length of write-off period, implemented an event study that took the day a company disclosed their write-off policy as the event day. In their results, they demonstrated that a significant positive effect on the stock price was observed, when a company announced its choice of short-term write-off option, and a significant negative effect on the stock price was observed when a company disclosed its selection of long-term write-off option. Consequently, managers' periodic decisions on the ASTD write-off policy had signaling effects to investors.

As we reviewed above, there are few prior researches that investigated the herd behavior in accounting policy. Moreover, while some literatures studied market reaction to the length of ASTD write-off period, there is no literature which tested market reaction to the write-off policy disclosure in the viewpoint of herd behavior.

¹¹ Concerning the companies that changed depreciation methods in Japan, however, stock price change was not observed in a few researches which verified the relationship between reported income and stock price (Sakurai [1991], pp. 333-359, Otagawa [1999], pp. 119-137).

4. Research Design

In this section, we will discuss the research design which we would use in this paper. As mentioned in section 1, when the new retirement benefits accounting standards were introduced, managers were given the discretion to set the ASTD write-off period. Managers had to make a long term decision because the write-off periods might span long periods of time. Investors should also know it. Because of the effects of the transitional measures, poorly-performing companies often find that they must select the long-term ASTD write-off. Therefore, investors also assume that well-performing companies select the short-term write-off, and poorly-performing companies select the long-term write-off (① and ④ of figure 2) . However, there is the possibility of “herd behaviors” in categories other than those combinations (② and ③ of figure 2) . If well-performing companies dare to select the long term write-off, they reveal the fact of ‘having no positive factors in the future’ or of their ‘real performance’ being worse than the currently reported income. Therefore, it is not expected to be so many because these companies should not have such incentives, though there may actually be the case of ‘having no positive factors in the future’ in this category. On the other hand, if poorly-performing companies select the short term write-off, they give the signal of having some positive factors in the future. Therefore, it is expected to be many because these companies should have such strong incentives. We focused on the poorly performed companies that selected the short term write-off of ASTD and we called them ‘herd behavior companies.’

(Please insert figure 2 here)

Herd behavior companies combined ‘companies with positive factors in the future’ with ‘companies without positive factors in the future.’ In the case of the former, it is

rational for companies to select the short term write-off, which means 'rational herd behaviors.' In the case of the latter, it is rational for companies to select the long term write-off. However, they chose the short term write-off in order to follow the others. It is an irrational selection because they did more than possible based on the conditions. Therefore, we divided herd behavior companies into two categories: well performing companies in the future, and poorly performing companies in the future¹². On the one hand, the former is called 'rational herd behavior companies.' On the other hand, the latter is called 'irrational herd behavior companies'

Next, the conditions for the success of signaling, 'having positive factors in the future' for irrational herd behavior companies, are as follows: (1) the sacrifice (worsening of current performance) is sufficiently large and (2) the capital market is misled (deceived). The first condition is fulfilled because they abandoned the right to be able to write-off ASTD for 15 years, which means that they gave up showing the current well performance. However, verification is needed for the second condition. We will prepare the following hypothesis to verify whether the capital market could distinguish between the companies that could afford to write-off in the short period or could do more than possible among the companies that chose the short term write-off policy in spite of current poor performance.

H₁ : When a company with bad performance announces its choice of the short-term write-off policy, in case its policy does not bring an excessive burden to the company, this gives rise to a positive effect on the stock price.

¹² The short term write-off naturally has positive influence on the future performance of the companies because it means advance recognition of future expense. Therefore, we use the reported income of 5 years later as future performance.

H₂ : When a company with bad performance announces its choice of the short-term write-off policy, in case its policy brings an excessive burden to the company, this gives rise to a negative effect on the stock price.

In this paper, we specified subsample of herd behavior company form sample of 424 companies, each of which had to satisfy the criteria listed below in items (1) to (6).

- (1) There must have been an article discussing the company's ASTD write-off period in the Nihon Keizai Shimbun or the Nihon Keizai Kinyu Shimbun during the period April 1999 – March 2002.
- (2) Subject companies must have posted an increase in ASTD (unfunded) arising from the change in accounting standards, and the number of years in the write-off period had to be specified.
- (3) Subject companies had to be listed on the first or second sections of the Tokyo Stock Exchange.
- (4) The fiscal years of the subject companies had to end on March 31.
- (5) Complete consolidated financial statements and stock price information had to be available.
- (6) Subject companies could not be connected with the banking industry.

Criterion (1) was established to allow the identification of the days on which a large number of investors received information regarding the announcements of ASTD write-off policies. This was necessary to verify the response of securities markets to these announcements, which was the purpose of the study. Where the Nihon Keizai Shimbun and the Nihon Keizai Kinyuu Shimbun both published articles, but on different days, the article published on the earlier date was used as the sample. Criterion (2) was added because this study is focused on the decisions of corporate managers regarding

the write-off periods for liabilities. Criterion (3) was added because publicly listed companies were required for the verification of the effects on stock prices, and after careful consideration of the availability of data. If some subject companies ended their fiscal years at significantly separated points in time, it would have been difficult to determine which period's corporate performance was affected by the ASTD write-off policies. In order to avoid this, criterion (4) was added. Criterion (5) was set because the relevant data were required to evaluate the strength of corporate performance and to verify the effects on stock prices. Criterion (6) excluded companies from the banking industry, whose structure of financial statements differs from that of companies in other industries. Newspaper articles were taken from the Nikkei Telecom database, while accounting and stock price data were obtained from the Bloomberg database.

Next, we will discuss the configuration of the subsample. For this study, companies that are writing off their ASTD within three years were designated as "short-term write-off companies," and taking more than three years were designated as "long-term write-off companies." The reasons for dividing the categories were (1) The average write-off period for the study sample was 3.81 years, (2) By using the same standard as Choi and Tokuga [2007], we maintained consistency with the previous research.

Companies were designated as well performing or poorly performing in accordance with the criteria given below. We controlled differences in company size by dividing the operating income of each company for the fiscal year of its announcement event by its total assets. Then, we calculated the median value for the entire sample. Companies that exceeded the median were put into the well-performing company subset, and those that came below the median were designated as poorly-performing companies¹³. Operating income was used because it was critical that each company

¹³ Return on assets within the study sample was 0.0297. Statistics for incorporated businesses show industry-wide average return on assets for each fiscal year from fiscal 1999 through fiscal 2001 as 0.0227, 0.0289, and 0.0239, respectively; accordingly, it is considered that this paper makes rather difficult judgments regarding the strength of corporate performance.

has sufficient profit from the core businesses to afford the ASTD write-off costs.

We have to distinguish between rational herd behavior companies and irrational ones to verify H_1 and H_2 . We define companies whose figure of net income before starting its ASTD write-off improve in five years later as “rational herd behavior companies”, and we define the other companies as “irrational herd behavior companies”.

In this paper, we analyzed the response of securities markets to the announcement of companies' ASTD write-off policies, before and after the announcements; specifically, taking the day of publication, by the Nihon Keizai Shimbun or Nihon Keizai Kinyuu Shimbun, of an article on ASTD write-off policies as the event day, we conducted an event study focused on stock price trends during the period from seven days before the event day until seven days after the event day. This event study assumed a condition of semi-strong form efficiency in the securities markets, and measured the difference between the rate of change in expected stock prices and the rate of change in actual stock prices. Using this analytical method, we confirmed whether there is additional information content within the announcement event. In this analysis, the rate of change in TOPIX was used as the market's expected return, and the abnormal return of each trading name was calculated using the equation below.

$$AR_{i,t} = \{(P_{i,t} - P_{i,t-1})/P_{i,t-1}\} - \{(M_t - M_{t-1})/M_{t-1}\}$$

Where, AR: The abnormal return of company i at time t

P: Company i stock price at close of trading day at time t

M: Closing value of TOPIX at time t

t: From -7 to +7

Next, the AR values for each sample at each point in time were added, then divided by the number of companies in the sample, which yielded the average abnormal return

(AAR) of the study sample. The three-day cumulative average abnormal return (CAAR) was calculated by adding the AAR values for time t , the day previous, and the day after. The CAAR is calculated while shifting the base point in time.

$$AAR_t = \frac{1}{N} \times \sum_{i=1}^N AR_{i,t}$$

$$CAAR_t[t-1, t+1] = \sum_{t=t-1}^{t+1} AAR_t$$

Where, N is the number of companies in the sample.

5. Descriptive Statistics and Result of Event Study

In this section, we discuss the result of analysis. Figure 3 is a cross-tabulation table showing these subsamples. The study sample numbered 424 companies, divided into 292 short-term write-off companies and 132 long-term write-off companies. Thus, we observed that approximately two-thirds of companies selected short-term write-off. In addition, the number of poorly performing companies which adopted lump-sum write-off was shown in the round bracket of Figure 3, and we found that these companies made up more than 60% of the total sample.

There is a possibility that the transitional measure which allowed companies to write-off ASTD as extraordinary loss only if they would achieve their ASTD write-off within five years caused the companies to select lump-sum write-off policy. However, if mid-term write-off policies were favorable for the companies, their optimal choices must be to write-off ASTD in five years. Therefore, we think that the beneficial measure may not be an important factor to influence manager's decision on the length of ASTD write-off period because most companies of the sample selected to write-off ASTD in three years and the proportion of lump-sum write-off companies to the total sample was high.

(Please insert figure 3 here)

Next, we will confirm the time series change in adoption rate of lump-sum write-off of ASTD. If it has risen dramatically, information cascade could occur when companies determined their period of ASTD write-off policies. Figure 4 is a table listing the change in adoption rate of lump-sum write-off of ASTD from April 1999 to March 2002. In the implementation of the new accounting standard for pension benefit obligation, the Business Accounting Deliberation Council permitted companies to select the timing when they would apply the new standard to themselves among three types; mandatory implementation (from April 2000 to March 2001), early implementation (from April 1999 to March 2000), and delayed implementation (April 2001 to March 2002). We can observe that the selection rate of lump-sum write-off policy rose from 30.8 percent to 67.7 percent, without taking delayed implementation companies which couldn't afford to apply the new accounting standard to them by mandatory date into consideration. This increase was not as sharp as so called "dramatic change", nevertheless we cannot deny the possibility that information cascade occurred in the companies' choice of lump-sum write-off policy.

(Please insert figure 4 here)

In this paper, we regard the companies which made choice of short-term write-off policy of ASTD regardless of their less performance as herd behavior companies. And then we can obtain 133 samples of herd behavior companies shown in Figure 3. About 90 percent of herd behavior companies adopted lump-sum write-off policy. Therefore we can't exclude the possibility that the herd behavior companies' write-off policy was affected by information cascade, and the economic rationality of their choice has to be verified. We divided 133 companies into rational herd behavior companies and irrational

herd behavior companies based on the criteria explained in section 4. Figure 5 provides the number of the former is 98 and the number of the latter is 29 (we can't get figures of the other six companies' net income because they were absorbed in absorbed type of merger and de-listed). Consequently, more than 73 percent of herd behavior companies chose their write-off period within their write-off abilities. Thus, the choice of short-term write-off could be explained as rational behavior.

(Please insert figure 5 here)

Next, we will discuss the results of event study conducted to verify whether the capital market incorporates the difference of herd behavior's rationality into the stock price. The statistical test method used to determine the significance of AAR and CAAR figures is the Wilcoxon Signed Ranks Test, a type of non-parametric test¹⁴.

(Please insert figure 6 and 7 here)

Figure 6 and 7 show the results of event study that was conducted to test H_1 and H_2 . Figure 6 is a graphical representation of the changes in CAAR on and around the event days. While numerous observations of rational herd behavior companies showed that CAAR displayed positive values, observations of irrational herd behavior companies showed that CAAR dropped conspicuously into negative values around the announcements of their write-off policies.

Figure 7 shows AAR and CAAR values and their significance, and then Panel A lists the result concerning rational herd behavior companies and Panel B contains the result concerning irrational herd behavior companies, respectively. AR value in Panel A

¹⁴ (1) No normal probability distribution was conducted on the study sample's stock returns. (2) As shown in Figure 2, after consideration of the existence of subsamples numbering as fewer than 100 companies, it was decided that a non-parametric test would be performed.

reports positive trend around the event day 0, which is not significant. However, AAR for event day +5 shows -0.480%, which is significantly different from zero at the 0.05 level. Also, AAR for event day +6 shows +0.426%, which is significantly different from zero at the 0.10 level. We can't find substantial change in AAR, because AAR +6 offsets against AAR +5. CAAR value in Panel B illustrates positive trend around the event day 0, which is significant. The evidence indicates that when poorly-performing companies announced short-term write-off policies of ASTD, if their policies were proportionate to their future profitability, a stock market perceived their write-off policies as favorable. Consequently, H1 was supported.

On the other hand, Panel B documents that AAR for event day 0 indicates -1.629%, which is significantly different from zero, and CAAR value for event day 0 also shows -2.744%, which is significantly different from zero at the 0.05 level. Therefore the evidence supposes that when poorly-performing companies announced short-term write-off policies of ASTD, if their choices were beyond their write-off power, investors perceived their write-off policies as unfavorable. Consequently, H2 was supported.

6. Regression Analysis

In previous section, we showed the results of event study which tested the market reaction to news of ASTD write-off policies. However, the announcement of company's write-off policy would convey the information of not only write-off period but also the amount of ASTD. Moreover, the capital market might evaluate the adequacy of the write-off policy in consideration of company's write-off ability. Therefore, we need to verify whether the rationality of decisions on ASTD write-off period would have explanatory power to the change in CAAR at the announcement day under controlling those factor mentioned above. Thereupon, in this section, we will address additional analysis by using regression model in order to control the other factors.

Yoshida [2002] reported that the amount of UPBO had negative co-relationship with the stock price. Therefore, we will add *ASTD* to our regression model as control variable whose expected sign of coefficient is negative, and *ASTD* denotes the amount of accounting standards transitional difference standardized by the amount of total assets (average number of the beginning and the ending balance; hereinafter the same meaning shall apply). Next, Choi and Tokuga [2007] and Otomasa [2008, a] found that well-performing companies preferred to write-off *ASTD* in short term. These evidences indicate that the amount of earnings will function as proxy of company's reserve power for *ASTD* write-off. Therefore, we will add *ERN* to our model as control variable. *ERN* denotes the figure of net income at the beginning of the period when a company announced its write-off policy, which is standardized by the amount of total assets. Expected sign of *ERN* is positive. In addition, Otomasa [2008, a] demonstrated negative association between the amount of company's net asset and write-off period of *ASTD*. Therefore, we will add *BV* to our regression model and *BV* denotes the amount of the net asset (average number of the beginning and the ending balance) standardized by the amount of total assets. Finally, Tokuga [1999] showed the tendency of a larger scale company (specifically, in terms of the amount of total assets, revenue, ordinary income, and number of employees) to voluntarily embark on a trial estimate of projected benefit obligation. And Otomasa [2008,a] provided the evidence that the large scale companies chose short-term write-off. These results suggest that corporate scale will function as proxy of company's *ASTD* write-off ability. Therefore, we will add *Asset* to our model as control variable, and *Asset* computed as the logarithm of the amount of total assets. *BV* and *Asset* are the proxy of the reserve strength for write-off of *ASTD*, and their expected sign of coefficient are positive, respectively.

Besides control variables described above, we will set *ROH* as dummy variable for the rationality of herd behavior. *ROH* binary variable equals "1" if a company's write-off policy is within its write-off power, and equals "0" if a company's write-off policy is

beyond its write-off ability. If the coefficient of ROH shows positive in our regression model including control variables, H_1 and H_2 could be supported. We will test H_1 and H_2 by using five regression models written as follows.

$$\text{Model 1 : CAAR} = \alpha + \beta_1 \text{ASTD} + \beta_2 \text{ROH} + \varepsilon$$

$$\text{Model 2 : CAAR} = \alpha + \beta_1 \text{ASTD} + \beta_2 \text{ROH} + \beta_3 \text{ERN} + \varepsilon$$

$$\text{Model 3 : CAAR} = \alpha + \beta_1 \text{ASTD} + \beta_2 \text{ROH} + \beta_4 \text{BV} + \varepsilon$$

$$\text{Model 4 : CAAR} = \alpha + \beta_1 \text{ASTD} + \beta_2 \text{ROH} + \beta_3 \text{ERN} + \beta_4 \text{BV} + \varepsilon$$

$$\text{Model 5 : CAAR} = \alpha + \beta_1 \text{ASTD} + \beta_2 \text{ROH} + \beta_3 \text{ERN} + \beta_4 \text{BV} + \beta_5 \text{Asset} + \varepsilon$$

(Please insert figure 9 and 10 here)

Figure 8 shows basic statistics of each variable. Many observations of experimental sample show “1” in the *ROH* distribution because rational herd behavior companies account for 73% of herd behavior companies. In addition, the distribution of *ERN* variable skewed left because its minimum value is large negative. With respect to the distribution of the other variables, we cannot observe any remarkable features.

Next, figure 9 describes Pearson’s Correlation Coefficient of each variable. Although we can observe a little high correlation between *BV* and *Asset*, absolute value of the other variable’s correlation coefficient shows less 0.250. Therefore, there may be less possibilities of the existence of multicollinearity¹⁵.

(Please insert figure 11 here)

Figure 10 lists the result of regression analysis by using regression estimation

¹⁵ When we estimated regression model (5) which included all independent variables, the value of VIF of each variable indicated around 1. Generally speaking, if the value of VIF is below 10, there is no risk that estimated regression model is affected by multicollinearity.

models which adopt *CAAR* as dependent variable and *ASTD*, *ROH*, *ERN*, *BV*, and *Asset* as independent variables. All regression models provide that the estimated sign of coefficient of *ROH* shows positive value, which is significantly different from zero at the 0.05 level. On the contrary, control variables using accounting figure have no explanatory power to *CAAR* for event day 0 statistically. These results were affected by the factor that *CAAR* is calculated at the time of not account day but the announcement day of *ASTD* write-off policy. These evidences from regression analysis indicate that the change in *CAAR* for the day of *ASTD* write-off policy announcement could be explained by the rationality of write-off policy under controlling the other factors. Consequently, a stock market saw through the rationality of company's *ASTD* write-off policy.

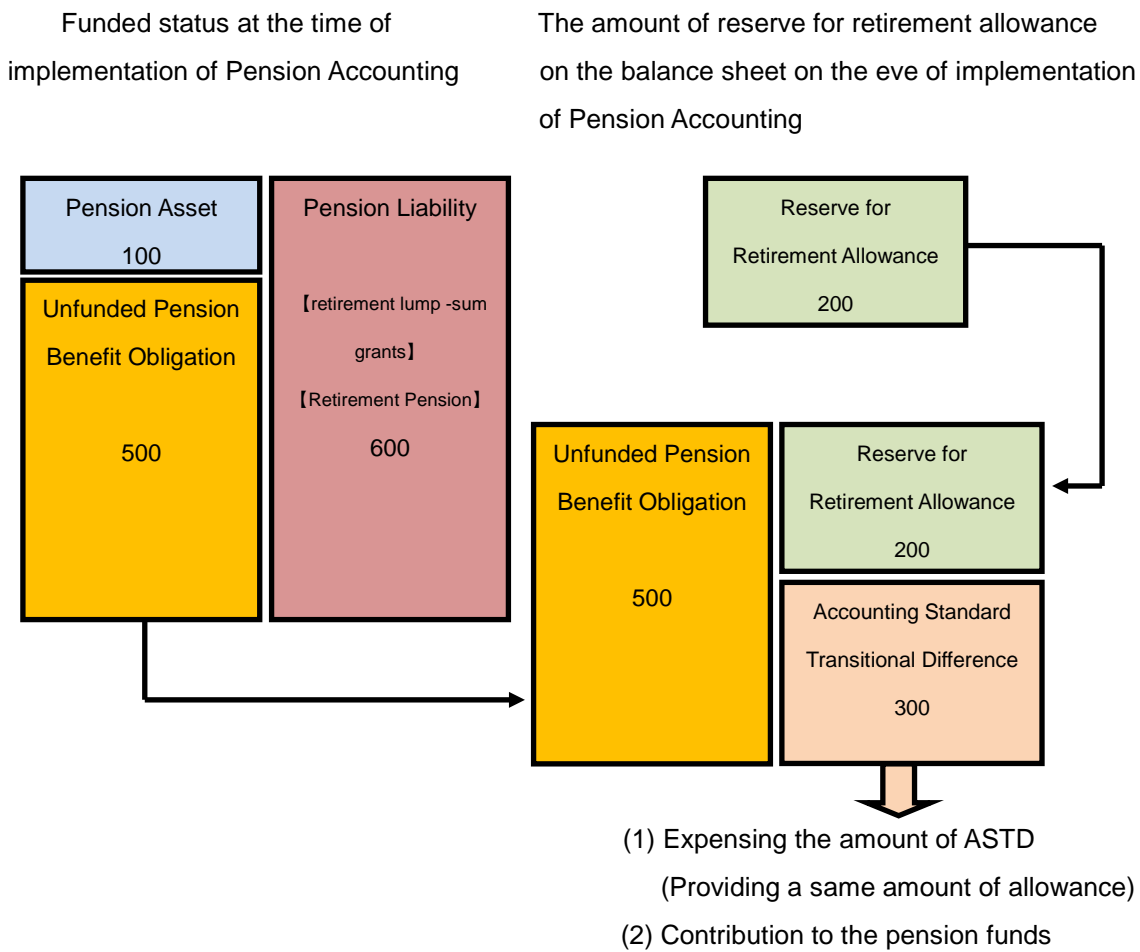
7. Conclusion

This paper verified rationality of “herd behavior” in accounting policy by using write-off policies of UPBO as the research subject. The possibility of herd behavior due to information cascade cannot be denied because the proportion of companies which adopt a year write-off policy grew according to our inquiries about the time series variation. Among herd behaviors, there are both rational and irrational herd behaviors due to information cascade. The research was to verify rationality of herd behavior focusing on the companies which chose the short term write-off in spite of low reporting income. As a result, we found that a large majority of companies adopted the rational policies.

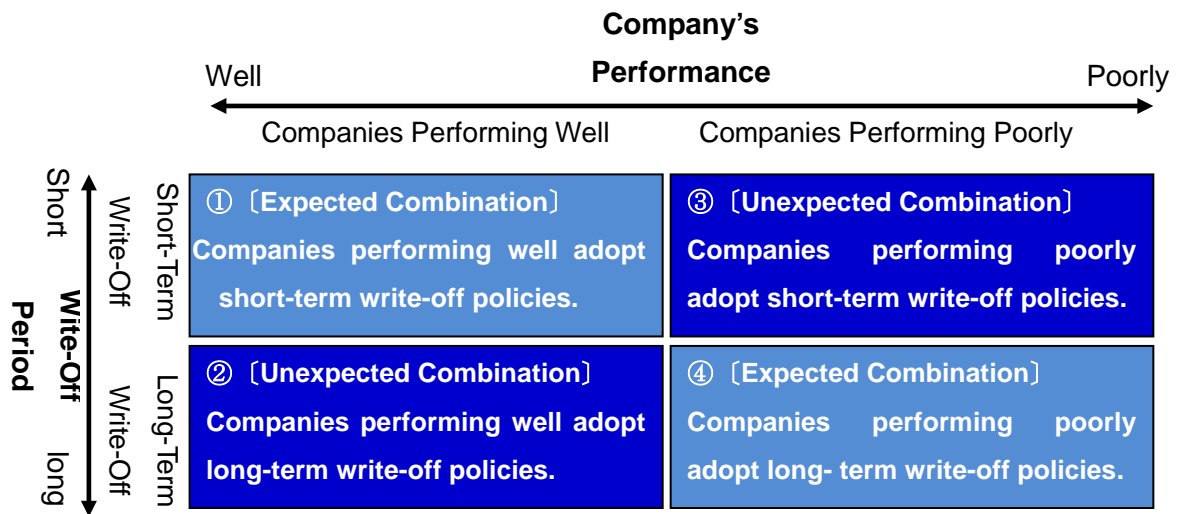
By researching the reaction of the capital market to disclose information about the write-off policies in the newspapers, we also found that the capital market could see through whether the write-off policy each company adopted earned its real power or not. This means that the screening, which the standard setter offered, was successful if the market is effective. The implication of this result is that irrational herd behavior is little.

The companies, which had expensed a large amount of UBPO, had to contribute financial instruments to the pension funds to extinguish the increasing amount of provisions due to this new standard. Although our analysis considers the future (5 years later) reporting income as the companies' real write-off powers, we will have to tackle additional research regarding the proportion of extinguishment for these provisions as the real power of the challenges for the future.

« Figure 1 » Illustration of Accounting Standards Transitional Difference



« Figure. 2 » Illustration of Combination of reported earnings and write-off policies.



« Figure 3 » Subsample Cross-Tabulation Table

	Companies performing well	Companies performing poorly	Totals	
Short-term Write-off	159	133	292	68.9%
(Lump-sum Write-off)	(142)	(118)	(260)	(61.3%)
Long-term Write-off	54	78	132	31.1%
Totals	213	211	424	100.0%

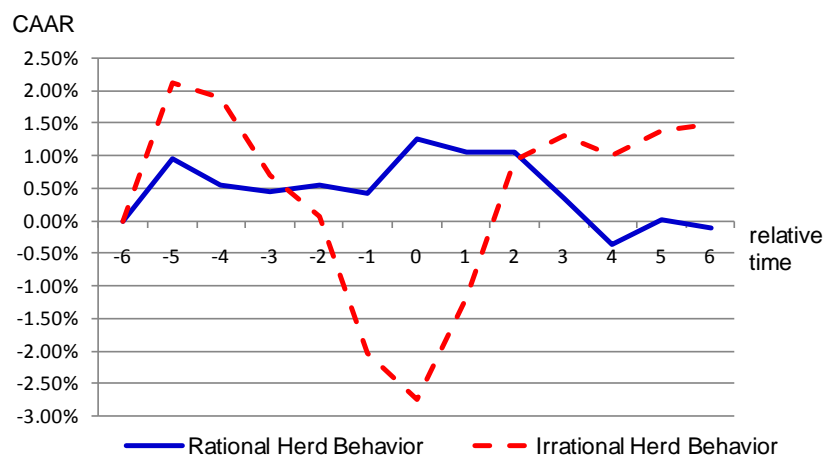
« Figure 4 » Longitudinal Change in Adoption Rate of Lump-Sum Write-Off Policy

	Early Application		Mandatory Application		Delayed Application	
	April, 1999 - Sept, 1999	Oct, 1999 - March, 2000	April, 2000 - Sept, 2000	Oct, 2000 - March, 2001	April, 2001 - Sept, 2001	Oct, 2001 - March, 2002
Companies Which Announced Write-Off Policy	13	68	171	124	34	14
Lump-Sum Write-Off	4	39	113	84	19	1
Except Above	9	29	58	40	15	13
Adoption Rate Of Lump-Sum Write-Off Policy	30.8%	57.4%	66.1%	67.7%	55.9%	7.1%

« Figure 5 » Rationality of Herd Behavior

Future Performance	Well Performing [Rational Herd Behavior]	Poor Performing [Irrational Herd Behavior]	Unidentified	Total
Poor Performing and Short-Term Write-Off Companies (Herd Behavior Companies)	98	29	6	133

« Figure 6 » Change in CAAR of Short-Term Write-Off Policy Disclosure by Herd Behavior Companies



« Figure .7 » AAR and CAAR of Herd Behavior Companies

Panel A: Rational Herd Behavior Companies

Time	AAR (%)	Wilcoxon Z	p-value	CAAR (%)	Wilcoxon Z	p-value
−6	0.590**	2.294	0.022			
−5	0.042	0.083	0.934	0.963**	2.241	0.025
−4	0.331*	1.749	0.080	0.557	1.075	0.282
−3	0.184	0.310	0.757	0.448	0.360	0.719
−2	−0.067	0.229	0.819	0.540	0.898	0.369
−1	0.423	1.426	0.154	0.420	0.611	0.541
0	0.064	0.650	0.516	1.266**	1.997	0.046
+1	0.779	1.401	0.161	1.061*	1.692	0.091
+2	0.218	1.132	0.258	1.060**	2.429	0.015
+3	0.063	0.601	0.548	0.345	0.813	0.416
+4	0.064	0.314	0.754	−0.353	1.164	0.244
+5	−0.480**	2.156	0.031	0.010	0.434	0.664
+6	0.426*	1.837	0.066	−0.110	0.930	0.352
+7	−0.056	0.941	0.347			

Panel B: Irrational Herd Behavior Companies

Time	AAR (%)	Wilcoxon Z	p-value	CAAR (%)	Wilcoxon Z	p-value
−6	0.725	0.032	0.974			
−5	1.637*	1.892	0.058	2.131	1.157	0.247
−4	−0.231	0.292	0.770	1.894	1.633	0.103
−3	0.488	0.551	0.581	0.692	0.465	0.642
−2	0.435	0.638	0.524	0.069	0.422	0.673
−1	−0.854	1.070	0.284	−2.048	1.114	0.265
0	−1.629*	1.870	0.061	−2.744**	2.000	0.045
+1	−0.261	0.141	0.888	−1.173	0.638	0.524
+2	0.717	0.854	0.393	0.926	0.054	0.957
+3	0.470	1.070	0.284	1.298	1.568	0.117
+4	0.111	0.011	0.991	0.996	0.638	0.524
+5	0.415	0.487	0.627	1.377	1.416	0.157
+6	0.851	1.330	0.184	1.495	1.611	0.107
+7	0.229	0.465	0.642			

Time denotes event day relative to write-off policy announcement day. AAR and CAAR are average abnormal return and cumulative average abnormal return for day t to the portfolio of subsample, respectively. Wilcoxon Z and p-value report Z-statistics and p-value for signed rank test. ***, **, *, denote significance level at the 1 percent, 5 percent, and 10 percent, respectively (two-tailed).

« Figure 8 » Basic Statistics

	CAAR	ASTD	ROH	ERN	BV	Asset
N	127	127	127	127	127	127
Min	−0.1367	0.0021	0	−0.1214	0.0151	4.4060
1st Q	−0.0248	0.0214	1	0.0008	0.2610	5.2147
Media	0.0064	0.0438	1	0.0048	0.3494	5.5873
3rdQ	0.0273	0.0879	1	0.0091	0.4640	5.9521
Max	0.2028	0.2302	1	0.0298	0.7995	6.9098
Mean	0.0055	0.0606	0.7717	−0.0023	0.3578	5.6177
STDEV	0.0511	0.0506	0.4214	0.0236	0.1500	0.5512

« Figure 9 » Pearson's Correlation Coefficient

	CAAR	ASTD	ROH	ERN	BV	Asset
CAAR	1.000	−0.086	0.184	0.003	−0.117	0.166
ASTD	—	1.000	−0.116	0.009	0.233	−0.104
ROH	—	—	1.000	−0.178	0.015	−0.051
ERN	—	—	—	1.000	0.095	−0.038
BV	—	—	—	—	1.000	−0.580
Asset	—	—	—	—	—	1.000

« Figure 10 » Result of Regulation Analysis

		Intercept	ASTD	ROH	ERN	BV	Asset	adjR ²	DW
Model 1	coefficient	0.014**	−0.067	0.021**	—	—	—	0.023	1.619
	t - value	1.993	−0.744	1.990					
	p - value	0.048	0.458	0.049					
Model 2	coefficient	−0.007	−0.066	0.022**	0.078	—	—	0.016	1.613
	t - value	−0.649	−0.737	2.023	0.401				
	p - value	0.517	0.463	0.045	0.689				
Model 3	coefficient	0.004	−0.040	0.022**	—	−0.038	—	0.027	1.621
	t - value	0.305	−0.435	2.046		−1.226			
	p - value	0.761	0.665	0.043		0.223			
Model 4	coefficient	0.004	−0.038	0.023**	0.104	−0.040	—	0.021	1.610
	t - value	0.299	−0.413	2.104	0.534	−1.272			
	p - value	0.765	0.680	0.037	0.594	0.206			
Model 5	coefficient	−0.091	−0.043	0.024**	0.100	−0.007	0.015	0.031	1.587
	t - value	−1.388	−0.466	2.178	0.517	−0.194	1.492		
	p - value	0.168	0.642	0.031	0.606	0.847	0.138		

CAAR is cumulative average abnormal return for day 0 to the portfolio of subsample. *ASTD* is the amount of accounting standard transitional difference divided by total asset. *ROH* is a dummy variable which equals 1 if a company's write-off policy has rationality, and otherwise 0. *ERN* denotes the figure of net income at the beginning of the accounting period when a company announced its write-off policy divided by total asset. *BV* is the amount of net asset divided by total asset. *Asset* denotes the logarithm of the amount of total asset. *DW* is Durbin-Watson ratio. ***, **, *, denote significance level at the 1 percent, 5 percent, and 10 percent, respectively.

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